

WHAT IS CLAIMED IS:

1. A method for replacing a portion of a gas turbine engine rotor blade, the rotor blade having a contour defined by a blade first sidewall and a blade second sidewall, said method comprising:

cutting through the rotor blade such that a cut line extends from a leading edge of the blade to a trailing edge of the blade, and between the first sidewall and the second sidewall;

removing the portion of the rotor blade that is radially outward of the cut line; and

coupling a replacement blade portion to remaining blade portion such that a newly formed rotor blade is formed with a predetermined aerodynamic contour.

2. A method in accordance with Claim 1 wherein coupling a replacement blade portion further comprises welding the replacement blade portion to the remaining blade.

3. A method in accordance with Claim 2 further comprising machining the weld such that the newly formed rotor blade has a contour that substantially mirrors that of the original blade contour.

4. A method in accordance with Claim 2 further comprising automatically welding the replacement blade portion to the remaining blade portion.

5. A method in accordance with Claim 1 wherein coupling a replacement blade portion further comprises coupling a replacement blade portion to the remaining blade portion that is fabricated from a material that is the same material used in fabricating the original rotor blade.

6. A method in accordance with Claim 1 wherein cutting through the rotor blade comprises cutting through a least one of a compressor rotor blade and a turbine rotor blade.

7. A method in accordance with Claim 1 wherein coupling a replacement blade portion to a remaining blade portion further comprises coupling the replacement blade portion to the remaining blade portion using a single weld joint extending along the cut line.

8. A method for replacing a portion of a gas turbine engine rotor blade, the rotor blade including a leading edge, a trailing edge, a first sidewall, and a second sidewall, and having a contour defined by the first sidewall and the second sidewall, said method comprising:

uncoupling the rotor blade from the gas turbine engine;

cutting through the rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall;

removing the portion of the rotor blade radially outward of the cut line;

coupling a replacement blade portion to the remaining blade portion;

and

contouring the replacement blade portion such that a newly formed rotor blade is formed with a predetermined aerodynamic contour.

9. A method in accordance with Claim 8 wherein coupling a replacement blade portion further comprises welding the replacement blade portion to the remaining blade portion.

10. A method in accordance with Claim 9 wherein coupling a replacement blade portion further comprises automatically welding the replacement blade portion to the remaining blade portion.

11. A method in accordance with Claim 8 wherein coupling a replacement blade portion further comprises coupling a replacement blade portion to the remaining blade portion that is fabricated from a material that is the same material used in fabricating the original rotor blade.

12. A method in accordance with Claim 8 cutting through the rotor blade further comprises cutting through a least one of a compressor rotor blade and a turbine rotor blade.

13. A method in accordance with Claim 8 wherein coupling a replacement blade portion to a remaining blade portion further comprises coupling the replacement blade portion to the remaining blade portion using a single weld joint extending along the cut line.

14. A method in accordance with Claim 8 further comprising coupling the replacement blade portion to the remaining blade portion using at least one of a nickel alloy, a titanium alloy, and an iron alloy.

15. A method for replacing a damaged portion of a gas turbine engine rotor blade, the rotor blade including a leading edge, a trailing edge, a first sidewall, and a second sidewall, and having a contour defined by the first sidewall and the second sidewall, said method comprising:

uncoupling a compressor rotor blade from the gas turbine engine;

cutting through a portion of the damaged rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall;

removing a portion of the damaged rotor blade extending radially outward of the cut line;

welding a replacement blade portion to the remaining blade portion;
and

contouring the replacement blade portion such that the newly formed compressor rotor blade has a contour that substantially mirrors that of the original compressor rotor blade contour.

16. A method in accordance with Claim 15 wherein welding a replacement blade portion to the remaining blade portion further comprises automatically welding the replacement blade portion to the remaining blade portion.

17. A method in accordance with Claim 15 wherein welding a replacement blade portion to the remaining blade portion further comprises coupling a replacement blade portion to the remaining blade portion that is fabricated from a material that is the same material used in fabricating the original rotor blade.

18. A method in accordance with Claim 15 wherein welding a replacement blade portion to the remaining blade portion further comprises welding the replacement blade portion to the remaining blade portion using a single weld joint along the cut line.

19. A method in accordance with Claim 15 wherein welding a replacement blade portion to the remaining blade portion further comprises welding the replacement blade portion to the remaining blade portion using at least one of a nickel alloy and a titanium alloy.

20. A method in accordance with Claim 15 further comprising rough blending the welded replacement portion and final blending the welded replacement portion such that the newly formed compressor rotor blade has a contour that substantially mirrors that of the original compressor rotor blade contour.